

REMARKS

The instant Application was filed on January 23, 2004. Claims 1-40 remained at issue with claims 41-43 withdrawn from consideration. In the most recent Office Action, claims 1-40 were rejected. In view of the amendments to the claims, Terminal Disclaimer and the discussion hereinafter, Applicants submit that the present application is in condition for allowance and reexamination thereof is hereby requested.

The Office Action

The Office has rejected claims 1-40 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,699,457 ('457) or U.S. Patent No. 6,964,757 ('757) both to Cortright, et al.

The Office has also rejected claims 1-40 under the doctrine of obviousness type double patenting over claims 1-27 of U.S. Patent No. 6,607,707.

The Office has further provisionally rejected claims 1-40 under the doctrine of obviousness type double patenting over claims 1-18 of copending Application serial no. 11/232,272.

The 35 U.S.C. 1-2(e)/103(a) Rejection

The Office has rejected claims 1-40 under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,699,457 ('457) or U.S. Patent No. 6,964,757 ('757) both to Cortright, et al. The Office has opined that it can see no distinction between the processes disclosed by the Cortright references and the process recited in the present claims.

Turning first to Claim 1, it should be noted that the claim has been amended to indicate that water is optional in the process of the present invention and that a carbonate and/or bicarbonate is formed as a by-product of the present inventive process. This amendment makes the distinction between Cortright and the present invention clear. The process of Cortright reacts very specific organic materials with water in the optional presence of a salt (which may include a hydroxide) to form primarily H_2 and CO_2 . Whereas the present inventive process reacts any organic compound containing 4+ carbon atoms with a base material, in the optional presence of water, to form primarily H_2 , carbonate and/or bicarbonate material. Thus there is a clear distinction between the process of the present claims and Cortright.

Cortright does not, as is required in the present claims react a base with the organic material. The base is optional in Cortright and is merely present when the organic material reacts with water. Specifically telling is Cortright's disclosure in '457 at column 15, lines 5-8:

If an optional modifier is used, it should be present in an amount from about 0.5% to about 10% by weight as compared to the total weight of the catalyst system used.

Clearly if Cortright intended the "optional modifier" to be reacted with the organic material, they would have based the amount of the "optional modifier" on the amount of organic material and not the amount of catalyst. Obviously this "optional modifier" must be something other than a reactant in the reaction. Further, the "optional modifier" does not even have to be a base material, but may be a neutral salt such as a carbonate, nitrate, or chloride.

One very clear indicator that the "optional modifier" (KOH is used in example 12 in the specification) is merely acting as a catalytic enhancer can be deduced from Figure 16 of the Cortright references. Figure 16 shows that as the concentration of KOH is increased up to 0.006 M, the production rate and selectivity of hydrogen production increase. However, when the concentration of KOH is further increased to 0.012 M, the production rate and selectivity do not further increase. If KOH were actively reacting with $C_6H_{14}O_6$ to form hydrogen, then the further increase in KOH concentration should have further increased both the production rate and the selectivity of hydrogen production.

Turning now to Example 12 of the Cortright references, Cortright reacts a 10 wt % aqueous sorbitol solution with the water in the solution, in the presence of 0.006 M KOH. Analyzing the Examiner's contention that KOH is reacting with sorbitol to produce the hydrogen, we first make an assumption for the sake of calculation that 1000g of solution = 1 liter of solution and take a basis of 1000g solution.

Sorbitol

$C_6H_{14}O_6$ - 182.17g/mole

10 wt % sorbitol solution =

100g sorbitol /1000g solution =

Therefor given a basis of 1000 g solution, we have 100g or 0.549 mole sorbitol

KOH

0.006 molar KOH solution =

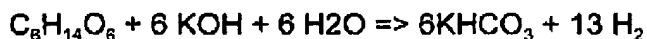
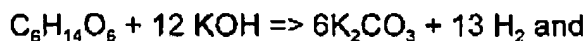
0.006 mole/liter =

0.006 mole/1000g solution

Therefor given a basis of 1000 g solution, we have 0.006 mole KOH

Thus, we have 549 mole sorbitol per 6 mole of KOH or 91.5 moles sorbitol per mole KOH.

The sorbitol reactions with KOH would be:



To make carbonate the stoichiometric ratio of sorbitol to KOH needs to be 1:12. Therefore to reach the proper stoichiometry, the 91.5 moles of sorbitol would need 1098 moles of KOH. The 0.549 moles/liter of Sorbitol would need 6.58 moles of KOH/liter. Thus to meet stoichionmetry, the KOH would have to be 1100 times more concentrated that it is.

To make bi-carbonate the stoichiometric ratio of sorbitol to KOH needs to be 1:6. Therefore to reach the proper stoichiometry, the 91.5 moles of sorbitol would need 549 moles of KOH. The 0.549 moles/liter of Sorbitol would need 3.29 moles of KOH/liter. Thus to meet stoichionmetry, the KOH would have to be 550 times more concentrated that it is.

The amount of KOH is clearly insignificant in comparison to the amount of sorbitol and the KOH does not contribute to production of hydrogen by the reaction of a base with an organic substance. As previously argued, and as is clearly stated in the Cortright references, the metal salt (KOH in the example) acts as a catalyst enhancer in the reactions thereof and does not directly contribute to the production of hydrogen by reaction with an organic substance. Thus the rejection of amended claim 1 over the Cortright references is now untenable and withdrawal thereof is requested.

Turning next to new claim 44, another aspect of the novel process of the present invention is claimed. That is, claim 44 is to a process for producing hydrogen gas by reacting an organic substance with a base (and optionally water) to form said hydrogen gas

without any substantial production of carbon dioxide. This is a feature that is clearly not taught or suggested by Cortright. Every one of Cortright's examples and equations indicates that the process of Cortright makes very large quantities of carbon dioxide. This cannot be avoided in Cortright because the organic material is reacted with water to form carbon dioxide and hydrogen. Thus, claim 44 and 45 are allowable over the Cortright references.

The Obviousness-Type Double Patenting Rejections

The Office has also rejected claims 1-40 under the doctrine of obviousness type double patenting over claims 1-27 of U.S. Patent No. 6,607,707.

The Office has further provisionally rejected claims 1-40 under the doctrine of obviousness type double patenting over claims 1-18 of copending Application Serial No. 11/232,272.

Applicants have filed herewith a Terminal Disclaimer to Patent No. 6,607,707 and copending Application Serial No. 11/232,272. Therefore these rejections are moot.

Conclusion

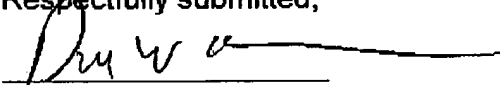
Claims 1-20, 22-25, 27-40 and 44-45 remain at issue. In view of the amendments to the claims, the terminal disclaimer and the discussion herein above, Applicants submit the present application is now in condition for allowance. Applicants respectfully request timely notice of allowance thereof.

Should the Examiner have any comments or suggestions which would place the instant application in better condition for allowance, Applicants earnestly request the Examiner to contact the undersigned.

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